
















# Beware of scientific scams! Hints to avoid predatory publishing in biological journals

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## Abstract

Our motivation for writing this editorial is to alert the academic community about the risks of predatory publishing in Biology. By piggy-backing on the open access (OA) movement and taking advantage of the “publish or perish” culture in a system that prioritises quantity over quality, predatory publishing has grown exponentially in recent years and spread across all areas of knowledge. Thousands of predatory journals and books have emerged and (provided a fee is paid) they publish scientific papers and chapters without submitting them to rigorous peer review. Now there are even predatory meetings, which promise to accept talks and publish complete works for a fee, also without reviewing them properly. These profit-making machines can damage both academia and society, putting at risk the quality of science and public trust in it, the well-being of the population, the conservation of biodiversity and the mitigation of climate change. We show the *modus operandi* behind invitations to contribute to predatory journals, books and meetings and suggest ways to separate the wheat from the chaff. Finally, we discuss the need to create regulatory agencies that perform a careful and systematic evaluation of the activities carried out by publishers.

**Key words:** Biodiversity, climate change, ecology, fake news, misinformation, open access, predatory journals, scientific publishing

## Predatory publishing

For centuries, scientific journals distributed in print were supported by subscriptions, annual fees paid to the societies that published them or article processing charges (APCs) paid by the authors (Fyfe and Gielas 2020). With the popularisa-

tion of the internet, online publishing emerged and, with it, new ways to charge for publications, such as readers paying to read and download papers and authors or institutions paying full publication costs to make papers available as open access (OA) (Joseph 2013). Piggy-backing on the open access movement, numerous predatory publishers have emerged in search of easy profits (Beall 2012; Eriksson and Helgesson 2017; Grudniewicz et al. 2019; Siler et al. 2021).

Predatory publishers are those willing to publish scientific articles, books and book chapters without submitting them to rigorous peer review, amongst other unethical practices. These predatory publishers do not provide any information about their peer review protocols (see Eriksson and Helgesson 2017) and are not concerned with the scientific, bibliographic or ethical aspects of publishing, but rather with the money received from authors (Siler et al. 2021). Aware of this situation, predatory publishers show extremely high acceptance rates, making the quality of their publications dubious (Siler et al. 2021).

Cybercriminals take advantage of the pressure for publications from which many researchers suffer in a system that prioritises quantity over quality (publish-or-perish culture, see Kiai 2019). In an academic market characterised by its competitive nature, professionals and students frequently face the pressure to distinguish themselves (Mello et al. 2013; Kurt 2018; Kiai 2019). In this scenario, led by the necessity and desire to join the current debates in their field, many researchers end up supporting predatory publications for recognition and to stand out (Kurt 2018). Often, these professionals perceive these journals as an easier opportunity to achieve their goals quickly, not understanding the broad negative consequences in the future (Kurt 2018).

This shady industry has grown rapidly in the last two decades and, today, there are thousands of predatory publishers around the world. Efforts have been made to combat this evil, such as the famous Beall’s List (Beall 2017), created in 2008 by Jeffrey Beall and maintained until 2017 (Table 1). This list included over 900 potentially dishonest journals and publishers (see Watson 2017). Of course, these lists must be used with caution because they cannot find and expose all predatory journals in a rapidly growing market and because some journals may be incorrectly classified (Watson 2017). However, to circumvent these problems, open automated systems for detecting predatory publishing have emerged, such as the Academic Journal Predatory Checking System (2023), created by Chen et al. (2023). This system allows searching for information about any journal and finding out whether it behaves suspiciously (Table 1). However, it can still make inaccurate judgments, so critical thinking is always needed (Watson 2017).

**Table 1.** Suggested websites, lists and databases that can be consulted as a source of information to confirm the nature and identity of predatory publishers.

Links	Description	Evaluated items	Availability
<a href="https://beallslist.net">https://beallslist.net</a>	Beall's list (2008 – 2017)	Predatory journals and publishers	Free access
<a href="https://buscatextual.cnpq.br">https://buscatextual.cnpq.br</a>	Brazilian Curriculum Lattes search	Brazilian researchers	Free access
<a href="http://cabells.com/predatory">http://cabells.com/predatory</a>	Cabell's list	Predatory journals and publishers	Prior registration
<a href="https://doaj.org">https://doaj.org</a>	Directory of open-access journals	Open access journals	Free access
<a href="https://scholar.google.com">https://scholar.google.com</a>	Google Scholar database	Researchers	Free access
<a href="https://scholar.google.com/citations?view_op=top_venues">https://scholar.google.com/citations?view_op=top_venues</a>	Google Scholar metrics	Journals indexed in Google Scholar	Free access
<a href="https://nature.com/nature-index">https://nature.com/nature-index</a>	Institutions database	Institutions	Free access

Links	Description	Evaluated items	Availability
<a href="https://isbn.org">https://isbn.org</a>	International standard book number	Books	Free access
<a href="https://issn.org">https://issn.org</a>	International standard serial number	Journals	Free access
<a href="https://jcr.clarivate.com/jcr">https://jcr.clarivate.com/jcr</a>	Journal Citation Reports database	Journals indexed in Web of Science	Prior registration
<a href="https://predatoryreports.org">https://predatoryreports.org</a>	List of predatory publications	Predatory journals and publishers	Free access
<a href="https://orcid.org">https://orcid.org</a>	ORCID database	Researchers	Free access
<a href="https://ispredatory.com">https://ispredatory.com</a>	Predatory publications database	Predatory journals and publishers	Free access
<a href="http://140.113.207.51:8000">http://140.113.207.51:8000</a>	Predatory publications database	Predatory journals and publishers	Free access
<a href="https://researchgate.net">https://researchgate.net</a>	ResearchGate database	Institutions, journals, publishers, researchers	Prior registration
<a href="https://www.scielo.org">https://www.scielo.org</a>	Scielo database	Journals indexed in Scielo	Free access
<a href="https://scopus.com/sources">https://scopus.com/sources</a>	Scopus database	Journals indexed in Scopus	Free access
<a href="https://webofscience.com/wos/author">https://webofscience.com/wos/author</a>	Web of Science database	Researchers	Prior registration

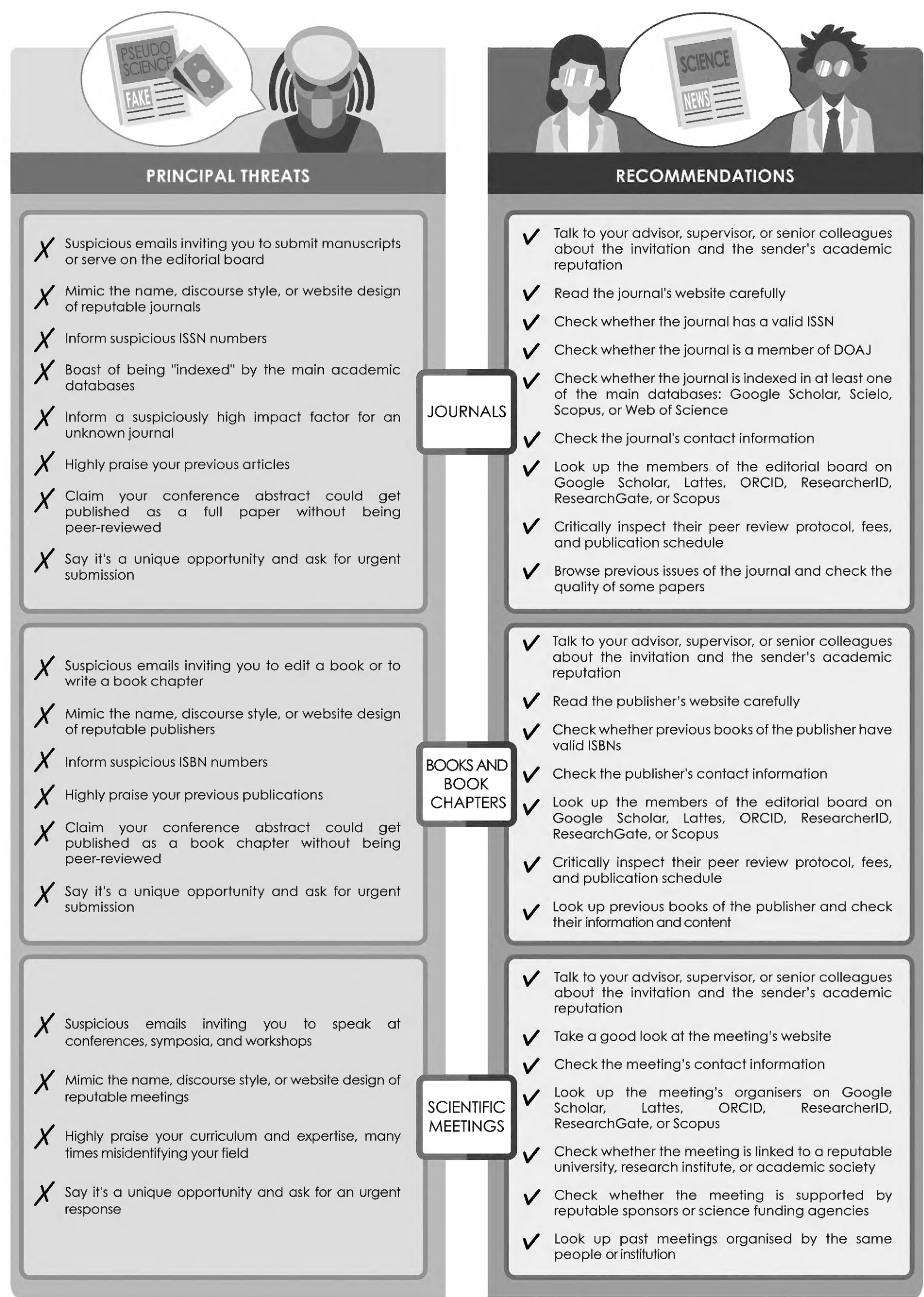


**A blow to Biology and how to get out of this dilemma**

The number of predatory publishers has grown exponentially in recent years and spread across all areas of knowledge (Grudniewicz et al. 2019; Marques 2023a), including biology. It is a common practice of these journals, often with an equally fake editorial staff (Sorokowski et al. 2017), to send electronic invitations to potential authors to publish articles. These invitations are often made by initial screening of emails of corresponding authors available on the internet (Grudniewicz et al. 2019) and from the abstracts of congresses. The emailed invitations from the supposed editors often stress that the author’s work is sound and, since it has already gone through the scrutiny of the editorial board, requires only the payment of a fee to publish it, with no need for further peer review (see Grudniewicz et al. 2019). Invitations to join the editorial board of these journals are also frequent (Sorokowski et al. 2017), which are mostly intended to take advantage of the scientists’ prestige. Instead of editing articles, these invited editors are used as poster boys, i.e. they have their names published on the journal’s website, thus attracting unsuspecting authors to submit their manuscripts (Sorokowski et al. 2017).

Predatory biological journals tend to have names that are very similar to those of traditional scientific journals with great credibility in the area, starting with phrases such as “American Journal...”, “Brazilian Journal...”, “International Journal...”, “Journal of Ecology...”, “Journal of Entomology...”, “Scientific Journal...”. These journals are generally not included in the directory of open access journals (DOAJ) and are not indexed in the main bibliometric databases, such as Google Scholar, Scielo, Scopus and Web of Science for the simple reason that they do not meet their inclusion criteria (Siler et al. 2021). Prior consultation of the webpages of these databases and other lists provided in Table 1 is usually enough to identify a predatory journal. The websites of these journals also provide hints of their predatory nature: they often focus more on inviting authors to submit their manuscripts than on presenting already published papers, the impact factor presented is fake and unusually high for an almost unknown journal that was launched only a few years ago, they often have little information about the editorial board, have a fake International Standard Serial Number (ISSN), lack transparency regarding their scope, provide no indication of a policy of retraction, have no transparency regarding copyright transfer and provide very vague contact information, often omitting the address of the journal’s office (Table 1 and Fig. 1).





**Figure 1.** Recommendations for identifying and avoiding the main threats posed by predatory publishers of journals, books and book chapters, as well as organisers of predatory scientific meetings.

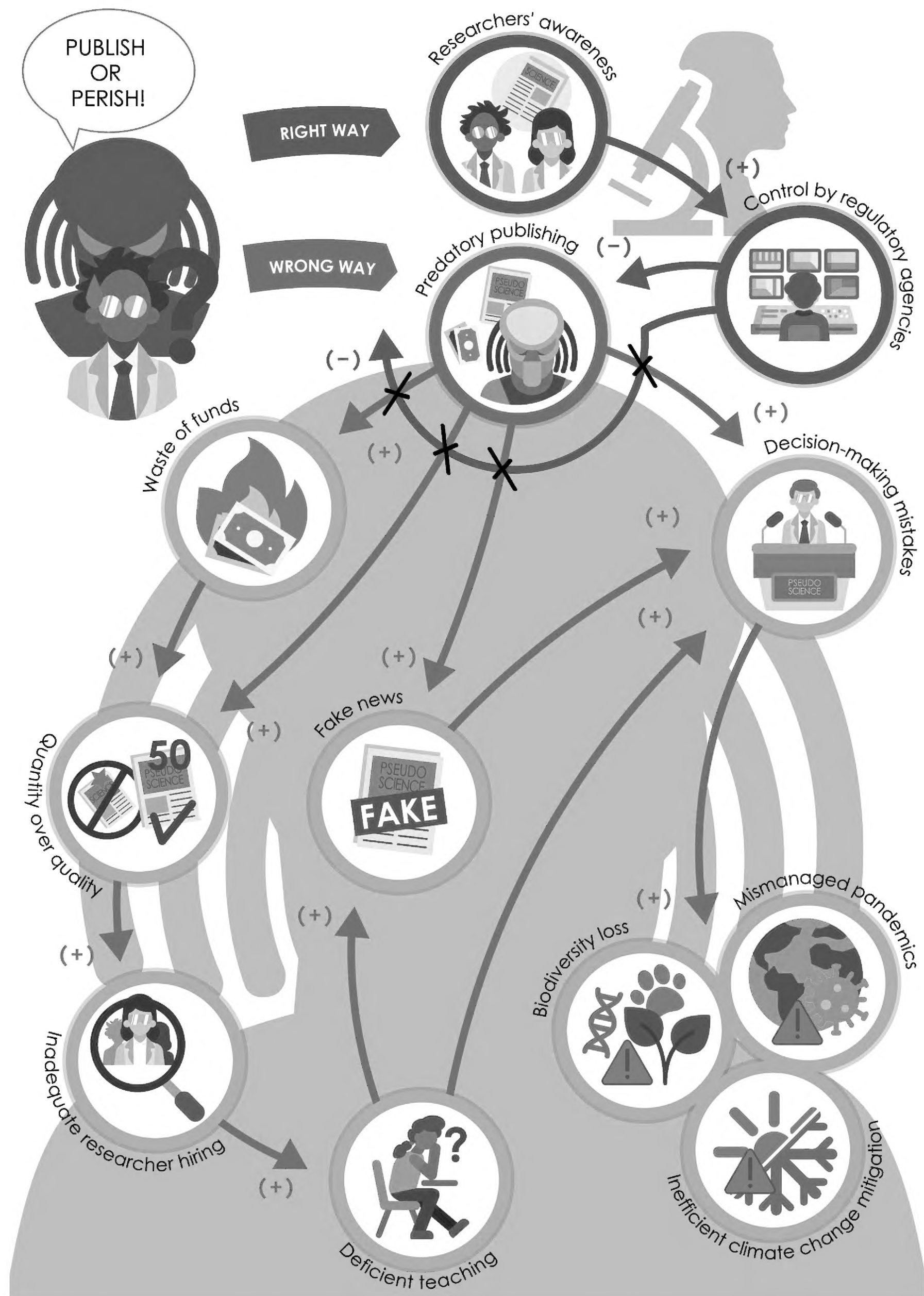
However, not all journals that lack indexing in the main databases are predatory (Marusic and Marusic 1999; Mello 2021). New journals, for example, are not ranked in their first year. Old small journals with a good reputation and an honest editorial staff (often managed by postgraduate programmes at renowned universities) may also not be indexed, but deserve respect (Mello 2021). Above all, one should consult advisors, supervisors or senior colleagues about the invitation and the sender's academic reputation (Mello 2017). In any case, one must pay attention not only to the citation metrics of these journals, but also and mainly, to their editorial board, ISSN, contact information and relationships with recognised institutions (Mello 2017) (Table 1 and Fig. 1).

Academic pursuits go far beyond scientific papers. Therefore, naturally, cybercriminals also take advantage of researchers by offering other ways to boost their curricula (Siler et al. 2021). In addition to papers, there are also invitations to publish books and book chapters (Eriksson and Helgesson 2017) with fake International Standard Book Numbers (ISBN) and dubious editorial boards (Fig. 1). There is also a flood of invitations to predatory meetings, such as online conferences, symposia, workshops and lectures (Siler et al. 2021). These often have websites that are equally confusing and never linked to a university or a postgraduate programme. To avoid falling for these scams, scientists must be aware of the identity of the people who organise the meetings, as well as the institutions and funding agencies behind the invitations (Table 1 and Fig. 1).

## Problems and solutions

All ranking systems have their weaknesses and predatory publishers find ways to infiltrate them (Chawla 2021). In Brazil, for example, we have Qualis/CAPES, maintained by the Coordination for the Improvement of Higher Education Personnel (CAPES), which lists and ranks the journals used to disseminate the intellectual production of postgraduate programmes and research institutions, regarding distribution reach (local, national or international) and quality, measured mainly by impact factor (A, B or C) within each academic area (Rocha et al. 2020). However, given the large number of journals being constantly evaluated, especially considering non-indexed journals classified in the lowest quality level ("Qualis C"), some predatory journals end up being inevitably included. We urgently need to create a system that thoroughly evaluates the true nature of these journals to banish them from ranking systems, thus reducing fake science and pseudoscience in biology (Siler et al. 2021).

"Paper mills" can be hired to produce articles using plagiarism (Grudniewicz et al. 2019) and the indiscriminate use of artificial intelligence (AI) (van Dis et al. 2023) and these are often published in predatory journals. In addition to technical errors, these papers may also provide a compilation of biased data that can be used in meta-analytical reviews, biasing their results and leading the scientific community in the wrong direction in many topics of public interest. These publications can contribute massively to the spread of fake news and misinformation, especially on social media (Grudniewicz et al. 2019; Leonard et al. 2022; Pereira 2022; Tollefson 2023) (Fig. 2).



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From the perspective of the scientific community, the worst problems are the dissemination of erroneous information about scientific problems of interest, the facilitation of plagiarism, the waste of public resources intended for publication (Grudniewicz et al. 2019) and the appointment of researchers at universities and research institutes, based on curricula full of doubtful publications, generating negative cascading effects that undermine higher education as a whole (Siler et al. 2021) (Fig. 2). The damage done to society can be even worse. Governments, large companies and decision-makers can be misled by false information, resulting in attitudes that undermine responses to major human problems, such as climate change (van der Linden et al. 2017), biodiversity loss (Burivalova et al. 2018) and pandemics (Leonard et al. 2022) (Fig. 2).

So far, most initiatives to expose this phenomenon and get research institutions and funders to pay attention and act have been individual. Efforts to fight predatory publishers require collaboration and support at higher levels. Institutions and governments need to create monitoring systems to put an end to predatory publishers and publishing cartels (Grudniewicz et al. 2019; Chawla 2021; Siler et al. 2021; Zhong and Liu 2022). Governments need to create regulatory agencies that carefully and systematically evaluate the activities carried out by scientific journals. We need to audit the entire publication protocols of journals and books (Fig. 2). Science funding agencies should require that publication fees be paid only to publishers that adhere to an internationally recognised set of transparency and ethical rules. We need to discuss our values and incentives in the academic community, so we can start prioritising quality over quantity (Mello et al. 2013). Finally, we also need to agree on a definition of predatory publishing and its typical signs (Marques 2023b) (Fig. 2). This would provide a reference point for research, help design coherent interventions and improve information and public policy in favour of global health, biodiversity conservation and climate change mitigation.

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## Additional information

### Conflict of interest

The authors have declared that no competing interests exist.

### Ethical statement

No ethical statement was reported.
















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## Author contributions

CCP conceived the ideas; CCP, MARM, DN, and GWF led the writing of the manuscript. All authors contributed critically to the drafts and gave final approval for publication.

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## Data availability

All of the data that support the findings of this study are available in the main text.

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